



Surdex Team

2005 NAIP Post Season Summary

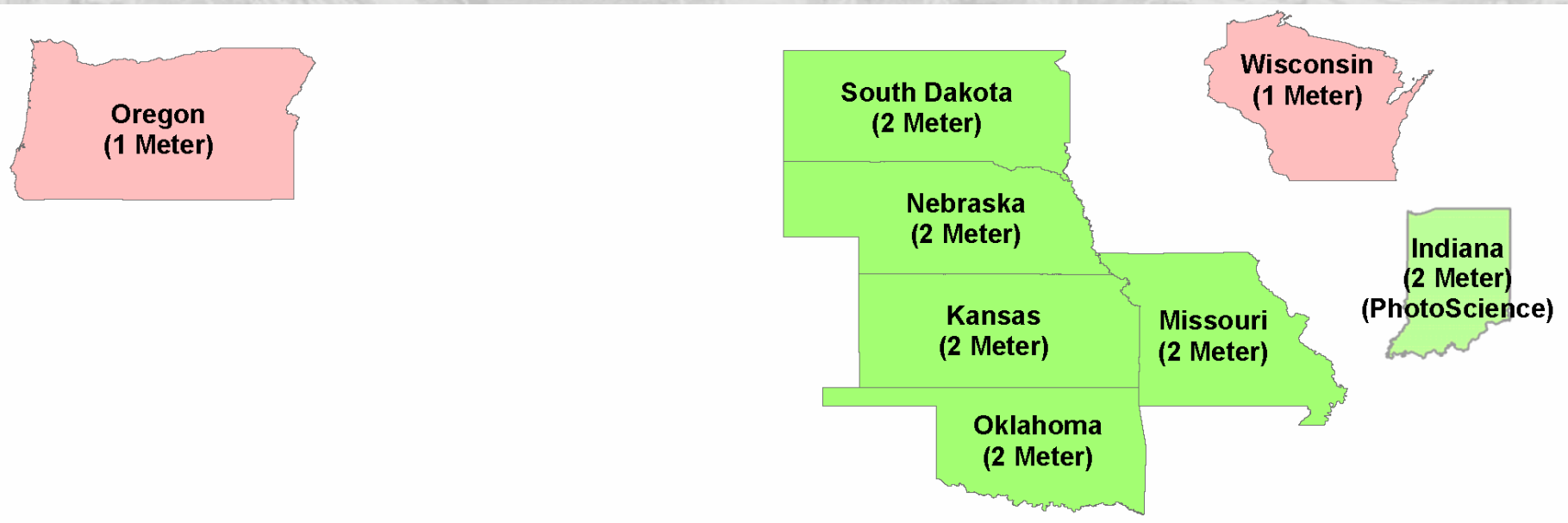
6 December, 2005

Ron Hoffmann, President
Craig Molander, SVP Business Development
John Boeding, SVP Production/Operations
Tim Bohn, NAIP/NRI Project Manager

Team Project Areas



- 7 complete states – all natural color, film acquisition
- Additional state (Indiana) for PhotoScience team – processing only (aerotriangulation → CCM production)
- Flight line miles: ~166,000
- DOQQs: 41,982 (including Indiana)
- Counties: 656 (including Indiana)





Team Members



- Surdex Corporation – prime contractor, all production
- Keystone Aerial Surveys – flying and scanning
- Great Lakes Aerial Surveys – flying
- Horizons – flying
- Tim Tyler Surveying and Mapping – flying

Aerial Photography



- 11 Aircraft (5 companies) – 8 pistons, 3 turbines
 - GE/MJ Harden unable to participate as planned – equipment problems with leased aircraft
- >96% efficiency (<4% rejections)

Company	Kansas	Missouri	Nebraska	Oklahoma	Oregon	South Dakota	Wisconsin	Total	% of Total
Surdex	24,263	9,310	11,401	18,082	22,248	11,399		96,704	58.2%
Keystone		12,068	13,095			13,909	4,769	43,840	26.4%
GLAS							14,157	14,157	8.5%
Horizons					9,764			9,764	5.9%
Tyler				1,733				1,733	1.0%
	24,263	21,379	24,496	19,814	32,012	25,308	18,925	166,197	

Photography Performance



- Granted early start in Nebraska
- Over-ran only Wisconsin (3 days)
- Flew over 80% of total days

	Program	Start Actual	Diff	Program	Finish Actual	Diff	Elapsed Days	Actual Days	Days Flown
Kansas	6/15	6/16	1	8/15	7/30	16	45	24	53.3%
Missouri	6/15	6/15	0	8/15	8/10	5	57	20	35.1%
Nebraska	7/1	6/29	(2)	8/31	8/27	4	60	22	36.7%
Oklahoma	6/1	6/2	1	8/31	7/9	53	38	24	63.2%
Oregon	6/15	6/29	14	8/31	8/13	18	46	33	71.7%
South Dakota	7/1	7/4	3	8/15	7/27	19	24	15	62.5%
Wisconsin	6/1	6/1	0	8/31	9/3	(3)	95	24	25.3%
							95	78	82.1%

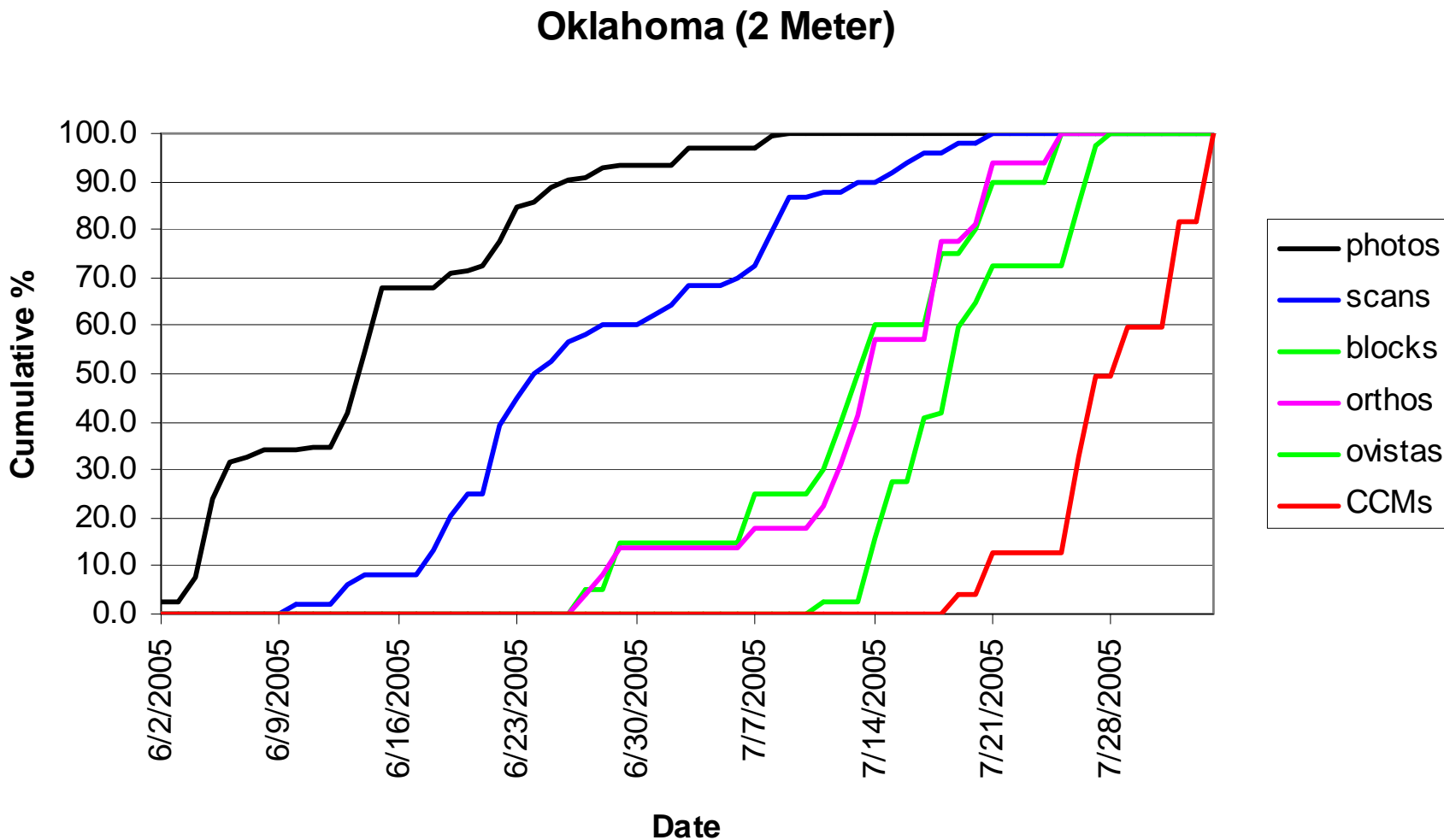
Timeline Analysis



- From production databases, the following dates were tracked for analysis:
 - Acquisition of photography
 - Image scanning (through QC)
 - Aerotriangulation blocks (“AT blocks”)
 - DOQQ/ortho generation
 - Balancing (OrthoVista, “ovistas”)
 - Shipment of CCMs

- Note: little, if any, time difference between AT blocks and ortho generation (aerotriangulation actually initiates ortho scripts)

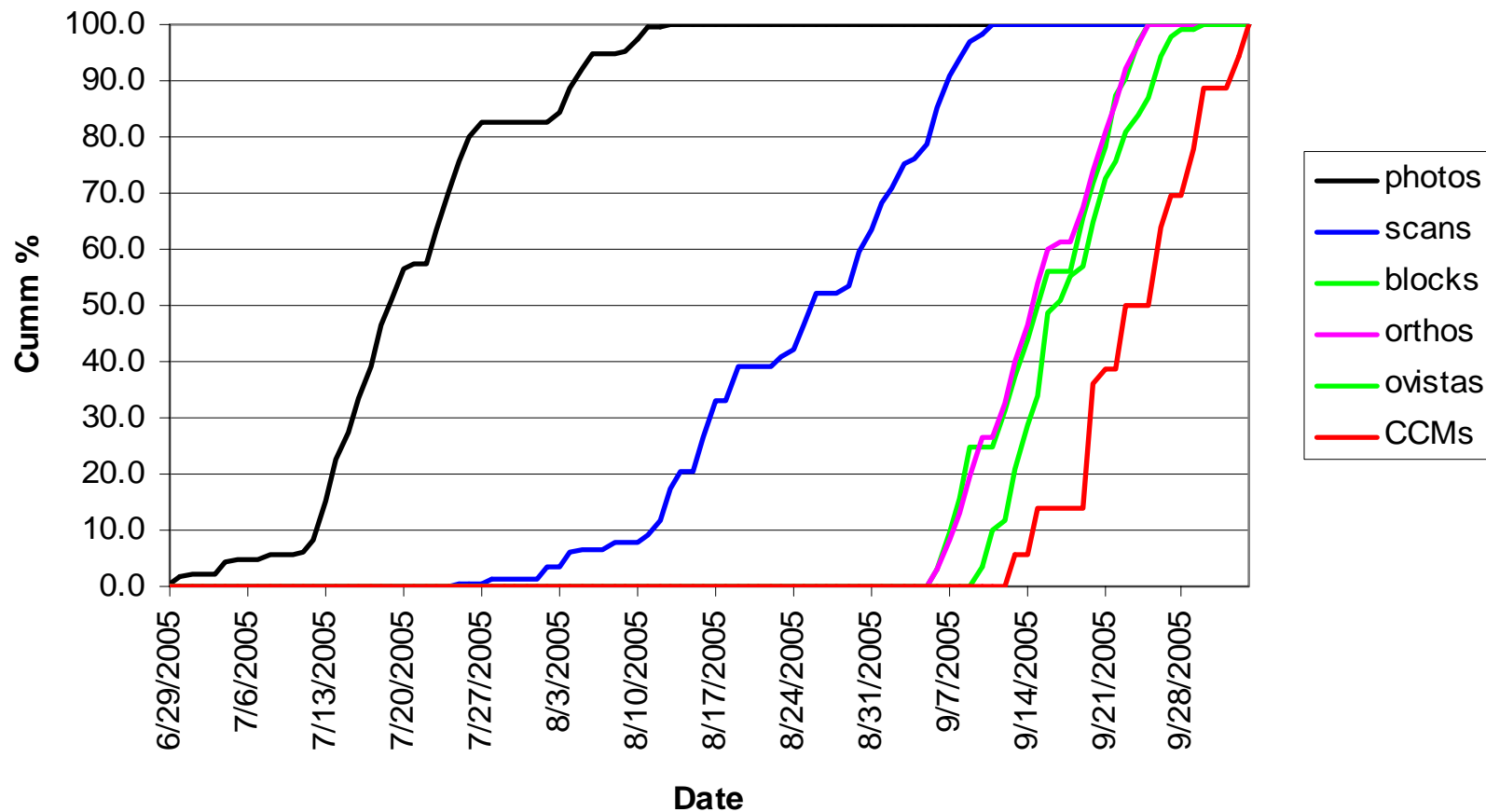
Oklahoma Timeline



Oregon Timeline



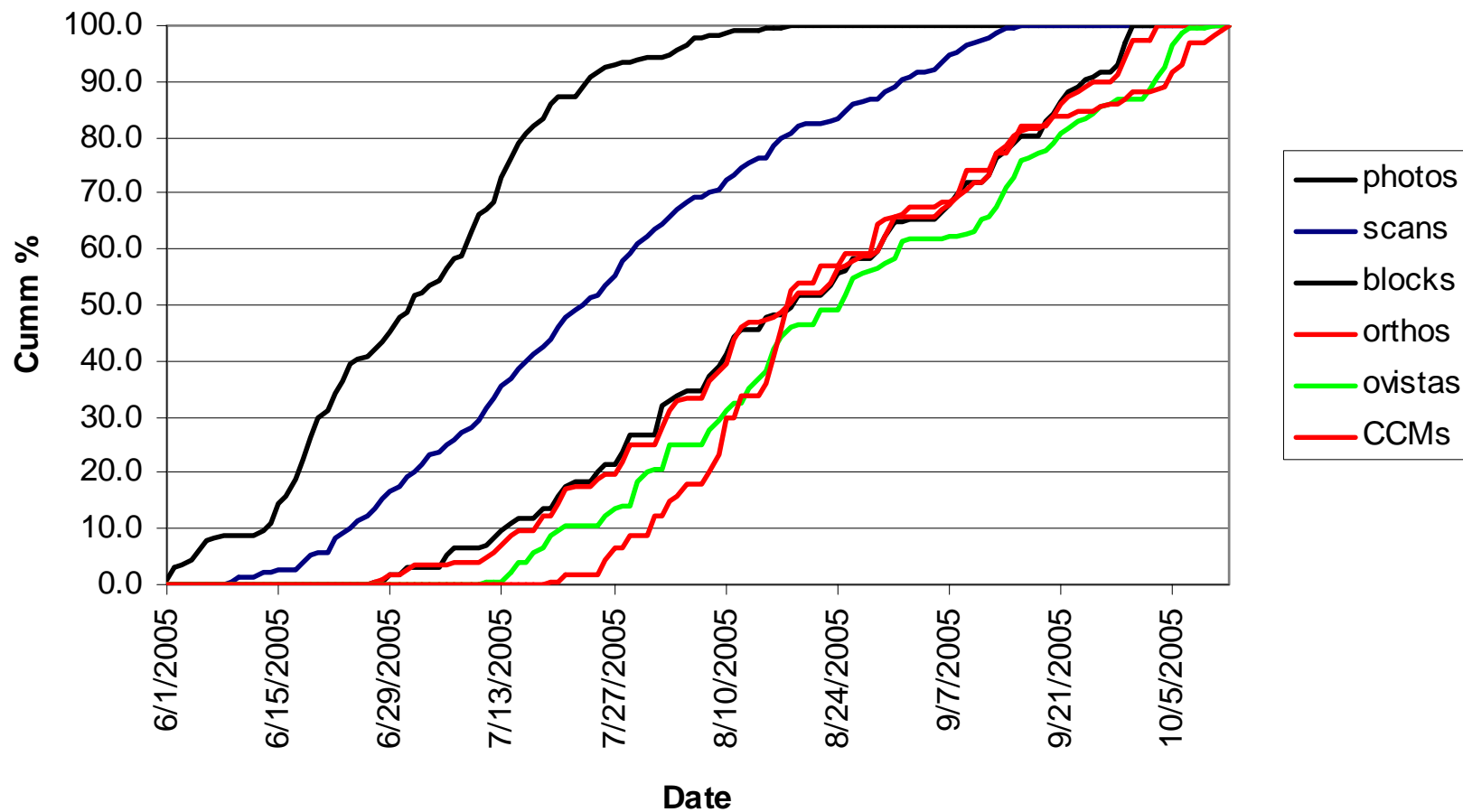
Oregon (1 Meter)



Timeline Analysis



Total Project





Overall Performance



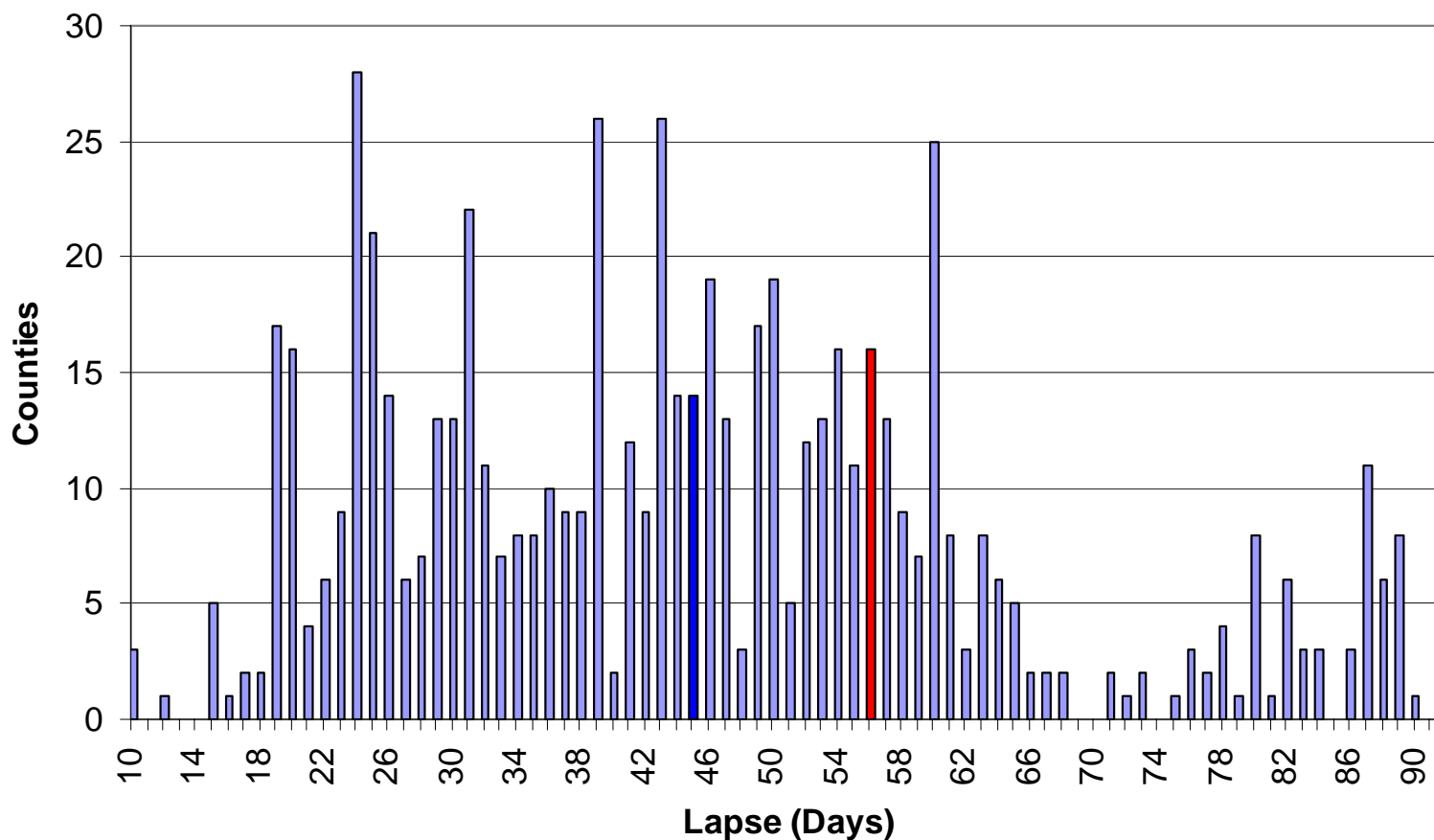
- Primary indicator is “time delay” relating acquisition of photography to shipment of CCM
- Most critical to end-users performing Compliance
- Measure of production performance
- **Time delay** = days from last exposure acquired in a county until shipment of the CCM

Overall Performance



Time Delay - Last Exposure to CCM Shipment

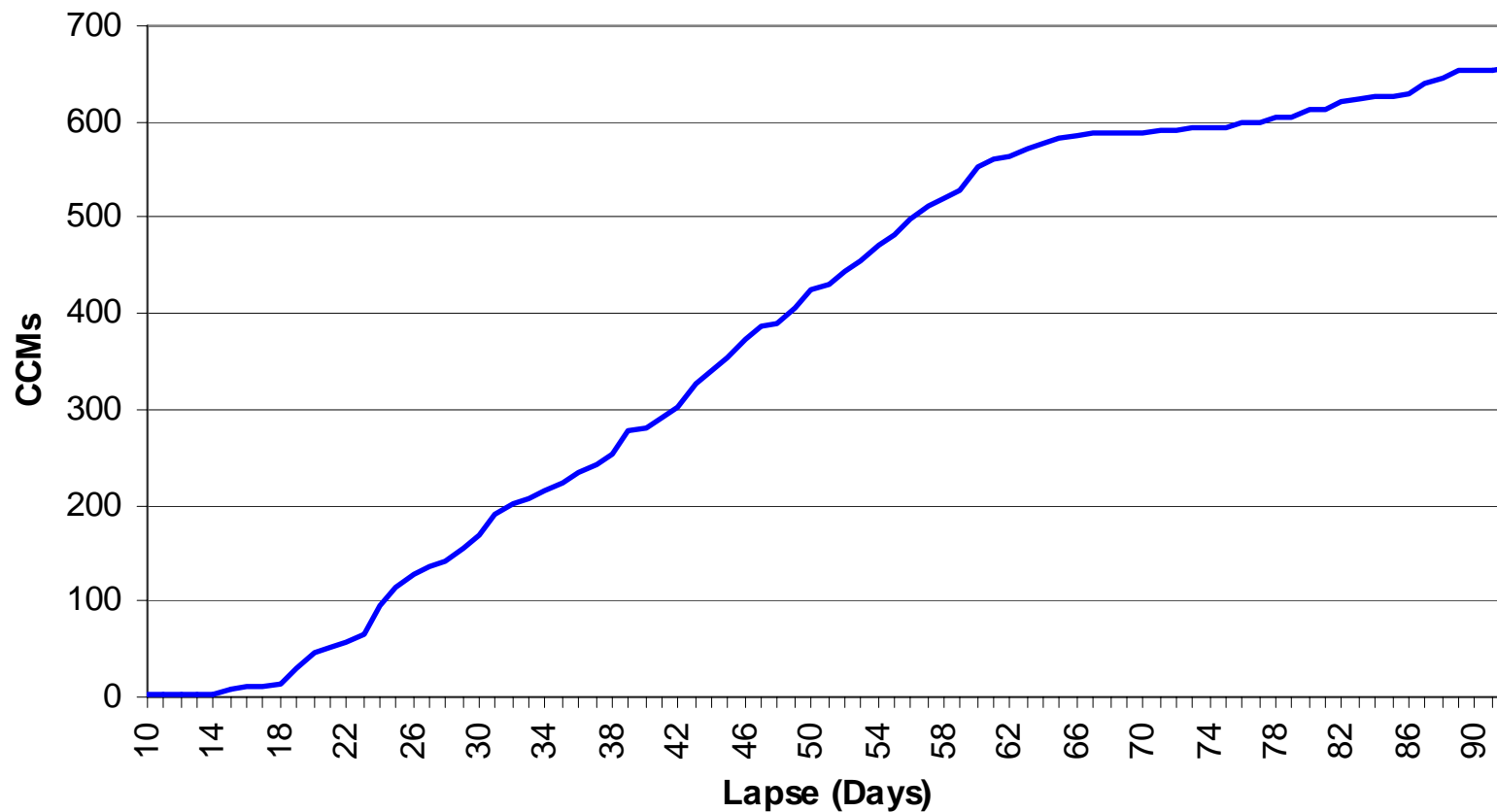
Within 45 Days: 45% **Within 55 Days: 75%**



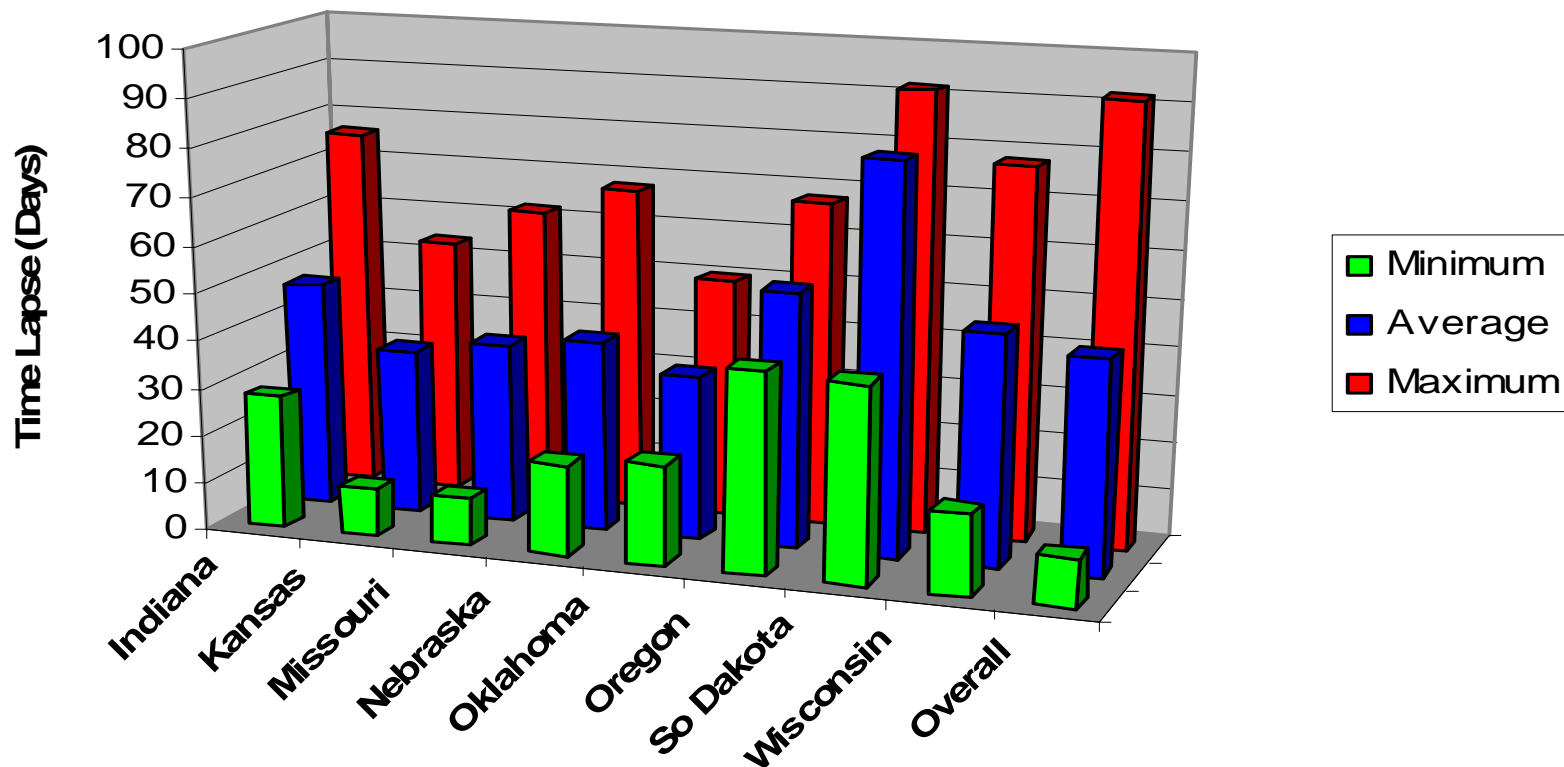
Overall Performance



**Cumulative CCM Delivery
(Days from Last Exposure)**



Time Delays by Project Area

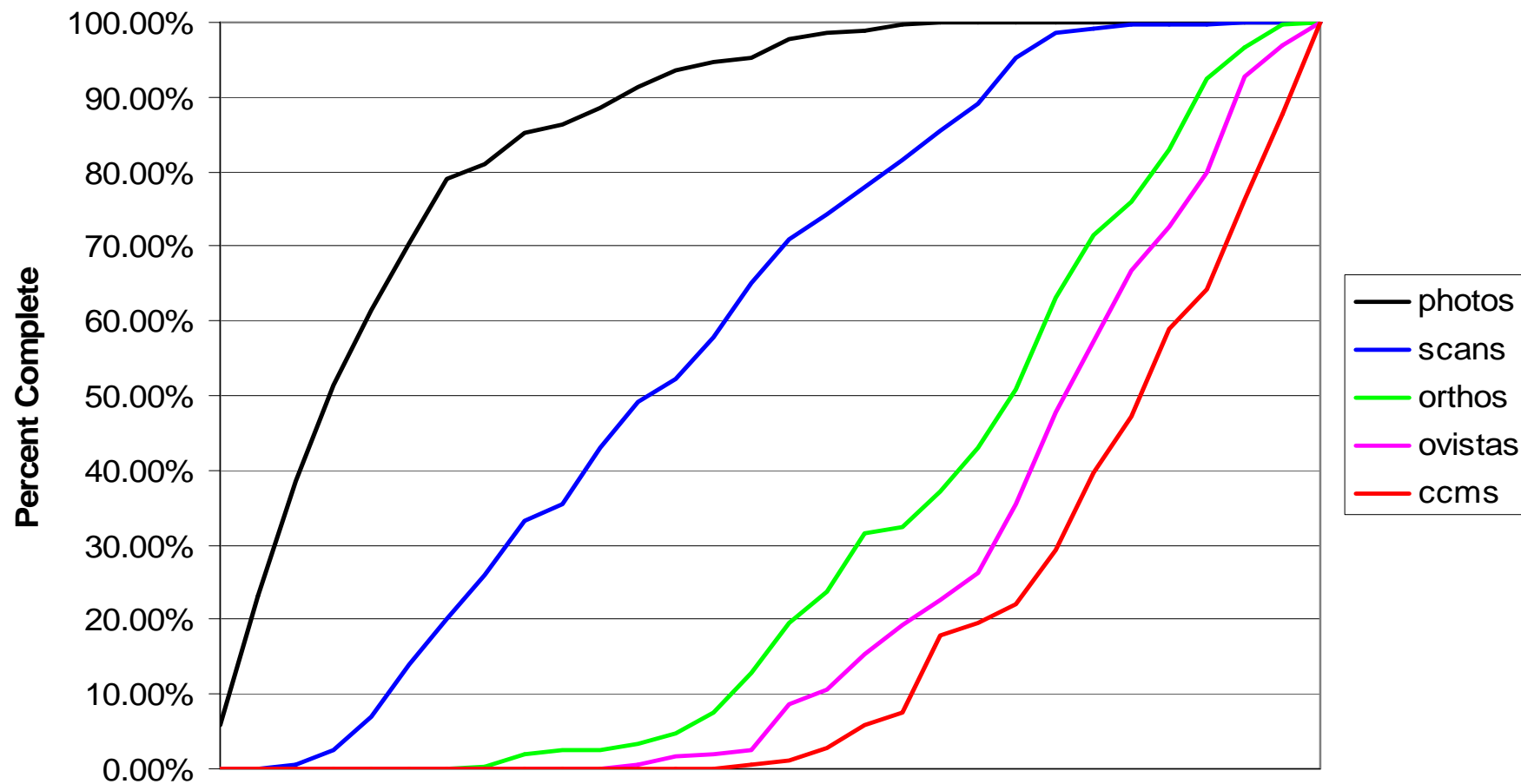


	Indiana	Kansas	Missouri	Nebraska	Oklahoma	Oregon	So Dakota	Wisconsin	Overall
minimum	28	10	10	19	21	42	41	17	10
average	47	35	38	40	34	53	81	48	45
maximum	76	54	62	68	50	68	92	78	92

Total Effort – Normalized



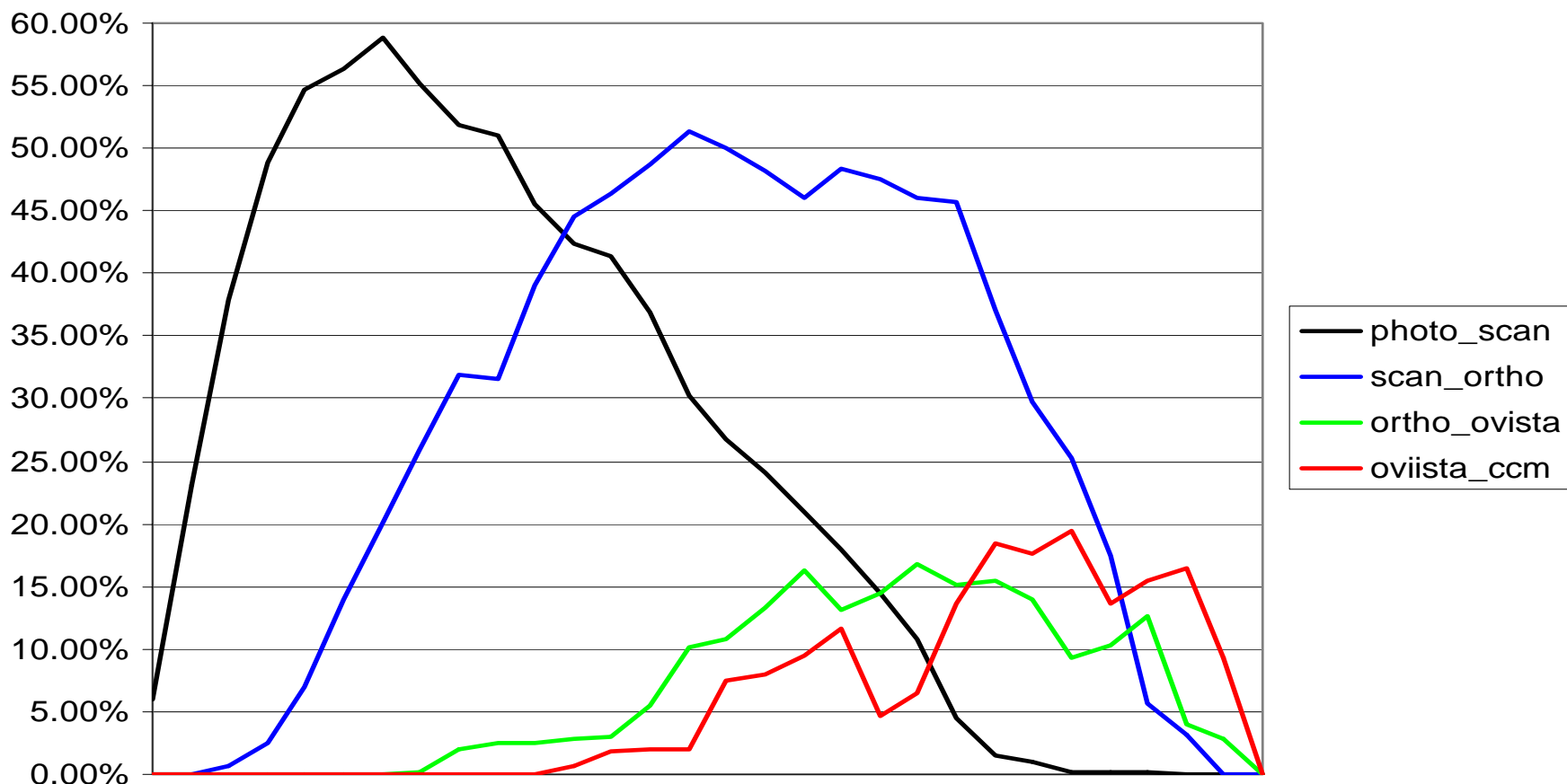
Total Cumulative Progress (Normalized)



Normalized Differences



Cumulative Percent Differences (Normalized)



Observations



- Time from acquisition to completion of scanning is single largest time difference
 - If flying goes smoothly, scanning will lag
- Scanning through completion of AT blocks/orthos next largest
 - Often related to “fractionated” areas where flying is incomplete – must wait until there is enough to work with

New Implementations



- Continuing investment in the enhancement of flight and production databases:
 - Development undertaken before and during project
 - More items and metrics tracked than in previous years
 - More queries and reports created in response to production requirements
 - Daily posting of standard status reports
 - Real-time status queries

New Implementations



- Scanned imagery saved at 12 bits/pixel – took remapping to 8 bpp out of the hands of the image scanner software
- Colorimetry handled using look-up tables for groups of exposures (eg: a mission)
- Dodging, colorimetry, remapping (12→8bpp) performed in a single step
- Less setup time required
- Less subjectivity by scanning technician
- More consistent colorimetry and tone balance

New Implementations



- Automated prediction of smearing and occlusions in DOQQs due to rugged terrain (eg: Oregon)
 - Ray trace algorithm using photo geometry and DEM
 - Occlusions and “grazing slopes” detected
 - Independent of orthorectification
 - Results contained in database
 - Pixel masks/shape files created for assessment
 - Eliminated need for specific QC
- Initial CCMs delivered with only “touch-up” for extremely bad areas (not affect agricultural areas)
- DOQQs/CCMS revised before final deliveries (using areas from adjoining DOQQs/orthos)

New Implementations



- Established standard schedule for full-time Surdex pilots
 - 15 days in field, followed by
 - 5 days off
 - Back-up crews work 5-day stints
- Less fatigue on aircrews
- Better for the “home front” – known schedules
- Aircraft maintenance performed during most crew exchanges
- Nearly all required aircraft inspections performed in-house

Recommendations



- Increase percentage of initial payment (60% - 70%) to accommodate increasing cost of acquisition (fuel...)
- If more stringent specifications are adopted, consider initial CCM delivery at less stringent specifications to avoid lengthening delivery schedules
- If sample products are used, suggest using raw imagery to ensure approval timeframe does not interfere with product delivery
- Request '05 survey results prior to beginning of '06 work to ensure user issues are addressed
- Examine use of MG3 compression – which is proprietary, time-consuming, error-prone